Exemption No. 6864

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Bombardier Aerospace

for an exemption from § 25.1435(b)(1) of Title 14, Code of Federal Regulations

Regulatory Docket No. 29409

GRANT OF EXEMPTION

By letter of November 20, 1998, Mr. Dan Burns, Manager, Airworthiness, Bombardier Aerospace, Bombardier Inc., 123 Garratt Blvd., Downsview, Ontario, M3K 1Y5, Canada, petitioned for an exemption. The proposed exemption, if granted, would be from the static pressure test requirement of 14 CFR § 25.1435(b)(1), for the hydraulic system on the Bombardier Model DHC-8 Series 400 airplane.

The petitioner requests relief from the following regulations:

> **Section 25.1435(b)(1)** states that a complete hydraulic system must be static tested to show that it can withstand 1.5 times the design operating pressure without a deformation of any part of the system that would prevent it from performing its intended function. Clearance between structural members and hydraulic system elements must be adequate, and there must be no permanent detrimental deformation. For the purpose of this test, the pressure relief valve may be made inoperable to permit application of the required pressure.

ANM-99-078-E

Related Section of the Federal Aviation Regulations (FAR):

Section 25.1435(a)(2) states that each element of the hydraulic system must be able to withstand, without rupture, the design operating pressure loads multiplied by a factor of 1.5, in combination with ultimate structural loads that can reasonably occur simultaneously. Design operating pressure is maximum normal operating pressure, excluding transient pressure.

The petitioner's supportive information is as follows:

In place of the static test (4500 psi), Bombardier proposes to conduct a proof pressure test at the system relief pressure, 3250 psig, and component testing at 1.5 times operating pressure (4500 psi) per § 25.1435(a)(2).

"Bombardier's position is derived from the discussion of NPRM 96-6, for FAR 25.1435(c)(3) - Hydraulic Systems Tests - which states that:

'The complete hydraulic systems must be functionally tested on the airplane in normal operation over the range of motion of all associated user systems. The test must be conducted at the system relief pressure or 1.25 times the design operating pressure if a system pressure relief device is not part of the system design. Clearance between hydraulic system elements and other systems or structural elements must remain adequate and there must be no detrimental effects.'

"In the NPRM 96-6, the FAA proposed to replace the current FAR 25.1435(b)(1) requirements to require a complete functional (dynamic) airplane test at a lower pressure. Specifically, the proposed rule requires that the complete hydraulic system must be functionally tested on the airplane over the range of motion of all associated user systems at the systems relief pressure or 1.25 times the design operating pressure if a system pressure relief device is not part of the system design.

"Therefore, Bombardier will conduct, on the aircraft, a dynamic test with the system(s) at system relief valve cracking pressure (3250 psig). The dynamic test will be conducted using ground hydraulic rigs attached at the ground service connections. The ground rigs will be adjusted to operate at 3250 psig discharge pressure which equates to system relief valve cracking pressure.

"Also, on the aircraft, each hydraulic powered system will be operated in turn through its full range of movement. A total of three full range operations will be conducted. The flap tests will be spaced out to allow sufficient cool-down time.

"Simultaneous operation of various systems will be conducted simulating normal flight operation. During these tests, careful observation will be kept on the components and tubing to see if any undesirable deflections or interferences occur.

"Bombardier shares the FAA's opinion, expressed in the NPRM 96-6, that the proposed functional test more approximates actual operating conditions than the existing static test. This is because for the static test, several parts of the system and associated relief valves, including return lines, may need to be disabled to allow the system pressurization at 1.5 times the design operating pressure because the relief valves are designed to open at a pressure lower than 1.5 times the design operating pressure.

"The DHC-8 Series 400 hydraulic system components and lines are individually tested to 1.5 times the design operating pressure as part of their qualification tests and acceptance test procedures to satisfy the current FAR 25.1435(a)(2) requirement. However, a complete hydraulic system is not planned to be tested in a single test on the aircraft as this requires extensive test preparation, unnecessary additional costs and does not add to the level of safety to be demonstrated by the dynamic test proposed and static tests already being conducted on the DHC-8 Series 400."

Bombardier notes that a precedence exists in that exemptions, similar to the exemption requested by Bombardier, were granted to The Boeing Company, Regulatory Docket No. 27384, for the Boeing Model 777-200, and to Bombardier Inc. Canadair, Regulatory Docket No. 29077, for the Global Express.

In view of the substantiating factors/discussion detailed above, Bombardier asserts that the granting of this exemption with respect to testing a complete hydraulic system at 1.5 times operating pressure is in the public interest. This is because the proposed method of demonstrating compliance will provide a safe and reliable product. The complete hydraulic system proof pressure test required by § 25.1435(b)(1) is of no additional value, and creates an unnecessary financial burden without adding to the level of safety. Bombardier therefore petitions the FAA to grant the subject exemption.

A summary of the petition was published in the Federal Register on December 16, 1998 (63 FR 69356). No comments were received.

The FAA's analysis/summary is as follows:

The FAA has carefully considered the information provided by the petitioner, and has determined that there is sufficient merit to warrant a grant of exemption.

Notice of Proposed Rulemaking, 96-6

The FAA concurs that the petitioner's proposed test is in compliance with the proposed harmonized rule change under consideration by the FAA and the Joint Aviation Authority (JAA).

Previously Granted Partial Exemption for 777-200 and Global Express

The FAA concurs that a precedent does exist based on the partial exemption granted for the Boeing 777-200 and the Bombardier Global Express.

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator (14 CFR 11.53), Bombardier Aerospace is hereby granted an exemption from § 25.1435(b)(1) of the FAR to the extent necessary to permit type certification of the Model DHC-8 Series 400. The type certification would be accomplished by conducting a proof pressure test of the hydraulic system at 3250 psig (the system relief pressure) per the proposed § 25.1435(c)(3) and by component testing at 1.5 times the operating pressure (4500 psig) per the current § 25.1435(a)(2). All test results pertinent to this exemption must be documented in a report and a copy provided to this office.

Issued in Renton, Washington, on February 22, 1999.

/s/ John J. Hickey
John J. Hickey
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service, ANM-100